Importation of Purple Passion Fruit *(Passiflora edulis)* from Chile into the United States

Qualitative, Pathway-Initiated Pest Risk Assessment

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A. Introduction

This pest risk assessment was prepared by the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture to examine plant pest risks associated with the importation into the United States of fresh purple passion fruit (*Passiflora edulis*) from Chile. This is a qualitative pest risk assessment, that is, estimates of risk are expressed in qualitative terms such as high or low as opposed to numerical terms such as probabilities or frequencies.

International plant protection organizations (*e.g.*, North American Plant Protection Organization (NAPPO), International Plant Protection Convention (IPPC) of the United Nations Food and Agriculture Organization (FAO)) provide guidance for conducting pest risk analyses. The methods we used to initiate, conduct, and report this plant pest risk assessment are consistent with guidelines provided by NAPPO, IPPC and FAO. Our use of biological and phytosanitary terms (*e.g.*, introduction, quarantine pest) conforms with the *NAPPO Compendium of Phytosanitary Terms* (NAPPO 1995) and the *Definitions and Abbreviations* (Introduction Section) in *International Standards for Phytosanitary Measures, Section 1—Import Regulations: Guidelines for Pest Risk Analysis* (FAO 1995).

Pest risk assessment is one component of an overall pest risk analysis. The *Guidelines for Pest Risk Analysis* provided by FAO (1995) describe three stages in pest risk analysis. This document satisfies the requirements of FAO Stages 1 (initiation) and 2 (risk assessment).

The Food and Agriculture Organization (FAO, 1995) defines "pest risk assessment" as "Determination of whether a pest is a quarantine pest and evaluation of its introduction potential". "Quarantine pest" is defined as "A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled" (FAO, 1995; NAPPO, 1995). Thus, pest risk assessments should consider both the likelihood and consequences of introduction of quarantine pests. Both issues are addressed in this qualitative pest risk assessment.

This document presents the findings of our qualitative plant pest risk assessment. We have not described in detail our assessment methods or the criteria we used to rate the various risk elements. Details of our methodology and rating criteria can be found in our "template" document: ***Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments*** (USDA, 1995); to obtain a copy of our template, contact the individual named on the front of this risk assessment.

B. Risk Assessment

1. Initiating Event: Proposed Action

This pest risk assessment is commodity-based, and therefore "pathway-initiated"; we initiated the assessment in response to the request for USDA authorization to allow imports of a particular commodity presenting a potential plant pest risk. In this case, the importation of fresh purple passion fruit from Chile into the U.S. is a potential pathway for introduction of plant pests. Quarantine 56 (7 CFR §319.56) provides a general regulatory authority for importation of fruits and vegetables.

2. Assessment of Weediness Potential of *Passiflora edulis*

Table 1 shows the results of our weediness screening for *Passiflora edulis*. These findings did not require us to initiate a pest-initiated pest risk assessment for *P. edulis*.

Table 1: Process for Determining Weediness Potential of Commodity

Commodity: *Passiflora edulis* (Purple Passion Fruit, Purple Granadilla)

Phase 1: *P. edulis* is grown in Hawaii and Florida (50-75 acres) commercially and as an ornamental. *P. edulis* also grows as a feral species in these states and is used as an ornamental. There is apparently no other commercial production of *P. edulis* in the continental United States. Various species of *Passiflora* are grown throughout the United States as ornamentals.

Phase 2: Is the species listed in:

YES	*Geographical Atlas of World Weeds* (Holm, 1979)
NO	*World's Worst Weeds* (Holm, 1977)
NO	*Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act* (Gunn & Ritchie, 1982)
NO	*Economically Important Foreign Weeds* (Reed, 1977)
NO	Weed Science Society of America list (WSSA, 1989)
NO	Is there any literature reference indicating weediness (*e.g.*, *AGRICOLA*, *CAB*, *Biological Abstracts*, *AGRIS*; search on "species name" combined with "weed").

Phase 3: Conclusion:

Holm (1979) listed *Passiflora edulis* as a weed in Brazil and Israel. However, its importance in Brazil is unknown and the author indicates that its weediness in Israel has not been confirmed. Because *P. edulis* already occurs in the United States, we proceeded with this pest risk assessment according to our guidelines (USDA, 1995).

3. Previous Risk Assessments, Current Status and Pest Interceptions

We reviewed a listing of recent (*i.e.*, since 1985) USDA pest interceptions on passion fruit from Chile. A single pest, the fungus *Ascochyta passiflorae*, was reported to have been intercepted on *Passiflora* fruit from Chile.

Several risk assessments for importation of fresh passion fruit have been conducted over the past few decades. Fresh passion fruit is currently enterable from Grenada, St. Vincent, Bermuda, and portions of Australia. Several risk assessments *(i.e.*, decision sheets) have been conducted for countries in South America and this commodity has not yet been allowed entry from any country in South America because of phytosanitary concerns. Two requests for importation from Chile were disapproved based on the results of the risk assessments. Requests in 1989 and 1993 were disapproved because there was no residue tolerance established by U.S. EPA for treatment for *Brevipalpus chilensis*.

4. Pest List: Pests Associated with *Passiflora* in Chile

Table 2 shows our pest list for *Passiflora edulis* in Chile. We generated the list after review of the information sources listed in USDA (1995). The pest list includes potential pests associated with the plant species (as opposed to only the plant part to be shipped). The pest list includes limited information on the distribution of each pest, pest-commodity association, and regulatory history. Not all pests listed in Table 2 are known to occur in Chile. For those pests listed below whose listed distribution does not include Chile (CL), although we had no specific literature record for the presence of the pest in Chile, records exist for surrounding countries and we considered it reasonable that the pest may also occur in Chile. While preparing this list, we assumed that all Quarantine 56 conditions would be in effect: only the specified commodity (*i.e.*, fresh fruit) would be shipped and no other plant parts would accompany the fruit.

Table 2: Pest List: Purple Passion Fruit, *Passiflora edulis* from Chile

Pest[1]	Distribution[2]	Comments[3]	Reference(s)
Fungi			
Alternaria alternata (Fr.:Fr.) Keissl.	CL US	c, f, m	Farr, *et al.*, 1989; Valdebenito & Pinto de Torres, 1972
Alternaria tenuissima (Kunze:Fr.) Wiltshire	CL US	c, f, m	Farr, *et al.*, 1989; Morales, *et al.*, 1974
Armillaria mellea (Vahl:Fr.) P. Kumm.	CL US	a, f, m	CMI, 1980; Farr, *et al.*, 1989
Ascochyta passiflorae Penz. Fruit spot	CL	x, z	ARS Fungal Database; Stevenson, 1926
Asterina ildefonsiae (Rehm.) Theiss. Synonym: *Seynesia balansae* Speg. var. *ildefonsiae* Rehm.	SX US(HI)	a, v	Wellman, 1977; Farr, *et al.*, 1989
Asterina megalospora Berk. & Curt. Black mildew	BR CO EC PE	a, v	Wellman, 1977
Botrytis cinerea Pers. Fruit rot and branch tip disease	CL US	c, f, m	Farr, *et al.*, 1989; Valdebenito & Pinto del Torres, 1972
Cladosporium herbarum (Pers.) Link	CL US	c, f, m	Farr, *et al.*, 1989; Morales, *et al.*, 1974

Table 2: Pest List: Purple Passion Fruit, *Passiflora edulis* from Chile			
Pest[1]	**Distribution[2]**	**Comments[3]**	**Reference(s)**
Fusarium solani (Mart.) Sacc. Teleomorph: *Nectria haematococca* Berk. & Broome Crown and basal canker	CL US	a, c, f, m	Alfieri, *et al.*, 1994; Alvarez & Briner, 1987; Farr, *et al.*, 1989
Leveillula taurica (Lev.) Arn.	CL US	a, f, m	CMI, 1984
Mycosphaerella passiflorae Rehm	SX	a, v	Wellman, 1977
Ovulariopsis passiflorae Syd. White mildew	SX	a, v	Wellman, 1977
Penicillium expansum Link	CL US	f, m	Farr, *et. al.*, 1989; Snowdon, 1990; Valdebenito & Pinto de Torres, 1972
Phytophthora nicotianae Breda de Haan	CL US	a, c, f, m	CMI, 1989
Puccinia scleriae (Paz.) Arth. Rust	SX	a, v	Wellman, 1977; Stevenson, 1975
Rhizoctonia solani Root rot, Thread blight	CL US	a, c, f, m	Farr, *et al.*, 1989; Kunstmann, *et al.*, 1986
Rhizopus stolonifer (Ehrenb.: Fr.) Vuill., Soft rot	CL US	c, f, m	Apablaza, *et al.*, 1974; Farr, *et al.*, 1989; Snowdon, 1990
Schiffnerula pitteriana Syd. Mildew	SX	a, v	Wellman, 1977
Sclerotium rolfsii Sacc. Southern blight	CL US	c, f, m	Farr, *et al.*, 1989; Montealegre & Esterio, 1989
Septoria passiflorae Louw Leaf spot of passion fruit	BR CO EC PE VE US	a, f, v, x	Holliday, 1980; Hutton 1993; Kranz, *et al.*, 1978; Wellman, 1977
Seynesia megalospora (Berk. & Curt.) Rehm	SX	a, v	Wellman, 1977
Nematodes			

Table 2: Pest List: Purple Passion Fruit, *Passiflora edulis* from Chile			
Pest[1]	**Distribution[2]**	**Comments[3]**	**Reference(s)**
Meloidogyne incognita (Kofoid & White) Chitwood Root knot nematode	CL US	a, f, m	Jimenez, 1985; Wellman, 1977
Meloidogyne javanica (Treub) Chitwood, Root knot nematode	CL US	a, f, m	Jimenez, 1985
Virus and viruslike agents			
Bean yellow mosaic virus	CL US	a, f, m	Tay, *et al.*, 1988
Tobacco mosaic virus	CL US	f, m	Nome & Docampo, 1969
Tomato ringspot virus	CL US	f, m	Auger, 1989
Arthropods			
Anastrepha fraterculus (Wiedemann) (Diptera: Tephritidae)	CL[4]	n, z_i	FAO, 1993; EPPO, 1994; PNKTO
Atta sexdens (Linnaeus) (Hymenoptera: Formicidae)	CL	e, n	PNKTO, CPPC
Brevipalpus chilensis Baker (Acari: Tenuipalpidae)	CL	n	Gonzalez, 1973
Ceratitis capitata (Wiedemann) (Diptera: Tephritidae)	CL[5] US[5]	h, x, z_i	FAO, 1993; Liquido *et al.*, 1995; PNKTO
Copitarsia consueta (Walker) (Lepidoptera: Noctuidae)	CL	a, n	McGuire, 1967; Gonzalez, 1973
Liriomyza huidobrensis Blanchard (Diptera: Agromyzidae)	CL US	a , g	FAO, 1993; Spencer, 1973 Spencer, 1990

Table 2: Pest List: Purple Passion Fruit, *Passiflora edulis* from Chile			
Pest[1]	**Distribution[2]**	**Comments[3]**	**Reference(s)**

Table Footnotes

[1] Pest names for pathogens and nematodes according to Farr, *et al.*, 1989 and Bradbury, 1986.

[2] Only distribution in South America and the United States is considered. Distribution codes: AR=Argentina, BO=Bolivia, BR=Brazil, CL=Chile, CO=Colombia, EC=Ecuador, PE=Peru, SX=South America, country unknown, VE=Venezuela, US=United States.

[3] Comments:

- a = Pest mainly associated with plant part other than commodity.
- c = Listed in U.S. Department of Agriculture (USDA) catalogue of pest interceptions as non-actionable.
- e = Although pest attacks commodity, it would not be expected to remain with the commodity (plant part) during processing
- f = Pest occurs in the U.S. and is not currently subject to official restrictions and regulations (*i.e.*, not listed as actionable or non-actionable, and no official control program)
- g = Quarantine pest; pest has limited distribution in the United States and is under official control as follows: pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity.
- h = Quarantine pest; pest has limited distribution in the United States and is under official control as follows: (1) pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity and, (2) pest is a "program pest" (there is an official Federal or recognized State program for control of this pest beyond its being listed in the pest dictionary as actionable).
- m = Pest is reported to occur in the PRA area and has been reported to attack the commodity in other geographic areas; but the pest has not been reported to attack the this commodity within the PRA area.
- n = Listed in the USDA catalogue of intercepted pests as actionable.
- v = No specific reports of the pest from the PRA area, but regional reports exist and the pest may be present in the PRA area
- w = Program pest, occurs in the U.S. but not widely distributed and being officially controlled.
- x = Multiple interception records exist
- z = Pest is known to commonly attack or infect fruit and it would be reasonable to expect the pest may remain with the fruit during processing and shipping.
- z_i = Internal feeder: Pest is known to commonly attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping

[4] *A. fraterculus* is listed in the cited data bases. *A. fraterculus* was detected in Chile in the 1950's. However, eradication was declared and *A. fraterculus* has not been detected in Chile since 1956. *A. fraterculus* is not considered further in this risk assessment beyond its listing in this table.

[5] *Ceratitis capitata* has been detected in both Chile and the United States. Whenever *C. capitata* is detected in either country, a quarantine is established and an eradication program is implemented. *C. capitata* is a quarantine pest in both countries.

5. List of Quarantine Pests

Our list of quarantine pests for commercial shipments of *P. edulis* fruit from Chile is provided in Table 4. Should any of these pests be intercepted on commercial (or any other) shipments of *P. edulis*, quarantine action may be taken.

Table 4: Quarantine Pests: Purple Passion Fruit from Chile	
Fungi	*Ascochyta passiflorae*
Arthropods	*Atta sexdens*
	Brevipalpus chilensis
	Ceratitis capitata
	Copitarsia consueta
	Liriomyza huidobrensis

6. Quarantine Pests Likely to Follow Pathway (Quarantine Pests Selected for Further Analysis)

We analyzed in detail only those quarantine pests that can reasonably be expected to follow the pathway, *i.e.,* be included in commercial shipments of *P. edulis* (see USDA, 1995 for selection criteria). Only quarantine pests selected for further analysis are subjected to steps 7-9 below.

Table 5: Quarantine Pest Selected for Further Analysis: *Passiflora edulis* from Chile	
Fungi	*Ascochyta passiflorae*
Arthropods	*Brevipalpus chilensis*
	Ceratitis capitata

7. Consequences of Introduction: Economic/Environmental Importance

We rate each pest with respect to potential economic importance based on five biological features referred to here as Risk Elements (RE). Details of the five RE's and rating criteria are provided in USDA (1995). Our ratings for these five RE's are shown in Table 6. The cumulative (Total) score for Risk Elements 1-5 (*i.e.*, the "Consequences of Introduction Risk Rating") is considered to be a biological indicator of the potential destructiveness of the pest.

Table 6: Risk Rating: Consequences of Introduction

Pest	Climate/ Host	Host Range	Dispersal	Eco-nomic	Environ-mental	Risk Rating
Ascochyta passiflorae	medium	low	medium	medium	medium	medium
Brevipalpus chilensis	high	high	medium	high	medium	high
Ceratitis capitata	high	high	high	high	high	high

8. Likelihood of Introduction

We rate each pest with respect to introduction (*i.e.*, entry and establishment) potential. We consider two separate components. First, we estimate the amount of commodity likely to be imported. More imports lead to greater risk; the result is a risk rating (0-2) that applies to the commodity and country in question and is the same for all quarantine pests considered. Second, we consider five biological features (*i.e.*, risk elements) concerning the pest and its interactions with the commodity. The resulting risk ratings are specific to each pest. Details of elements and rating criteria are provided in USDA (1995). The cumulative risk rating for introduction is considered to be an indicator of the likelihood that a particular pest would be introduced.

Table 7: Risk Rating: Likelihood of Introduction

Pest	Quantity of com-modity imported annually	Likelihood survive post-harvest treatment	Likelihood survive shipment	Likelihood not detect at port of entry	Likelihood moved to suitable habitat	Likelihood find suitable host	Risk Rating
Ascochyta passiflorae	low	high	high	low	low	low	medium
Brevipalpus chilensis	low	high	high	medium	high	high	high
Ceratitis capitata	low	high	high	high	high	high	high

9. Conclusion: Pest Risk Potential and Phytosanitary Measures

The overall risk posed by a particular pest depends on both the consequences and likelihood of introduction (see USDA, 1995). Our rating of the overall pest risk potential (PRP) for each quarantine pest selected for further analysis is shown in Table 8.

Table 8: Pest Risk Potential, Quarantine Pests, *Passiflora edulis* from Chile

Pest	Pest risk potential
Ascochyta passiflorae	**medium**
Brevipalpus chilensis	**high**
Ceratitis capitata	**high**

For pests receiving a PRP risk rating of high (*i.e., Brevipalpus chilensis* and *Ceratitis capitata*), we strongly recommend specific phytosanitary measures, port-of-entry inspection is not considered sufficient to provide phytosanitary security. For the single pest receiving a medium PRP risk rating (*Ascochyta passiflorae*) specific phytosanitary measures may be required. Detailed examination and choice of appropriate sanitary and phytosanitary measures to mitigate pest risk for particular pests is undertaken as part of the pest risk management phase and is not discussed in this document. APHIS has not yet determined whether risks associated with importations of *P. edulis* from Chile can be managed adequately. Nor has it been determined what measures would be used to manage plant pest risk should APHIS proceed with a proposed rule for importations of *P. edulis* from Chile. APHIS' final decisions regarding importation of *P. edulis* will be based on the results of a complete pest risk analysis. This pest risk assessment is the first stage of the risk analysis and constitutes a primary tool for the rounds of risk management and risk communication to follow.

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EXTRA

Liriomyza huidobrensis Blanchard (Diptera: Agromyzidae)	CL US	a , h	FAO, 1993; Spencer, 1973 Spencer, 1990